REMARKS

Applicant has amended the specification to provide proper antecedent basis for the claimed subject matter.

The Examiner has objected to the Drawings as not showing every feature of the claimed invention. Specifically, the Examiner contends that the "upper and lower surfaces having a surface area greater than the surface area of said sidewalls" of claim 4 is not shown. In response to this objection, Applicant has included Figure 9 which shows this feature. This new drawing does not contain any new matter as it illustrate the embodiment claimed in claim 4.

The Examiner has objected to the specification claiming that the description of the invention contains statements that are misleading or simply incorrect. The Examiner further rejects Claims 14-17 based on the objections to the specification. Applicant respectfully traverses the Examiners statement that the concept of fin efficiency is inapplicable to the instant invention. Applicant submits that in the art a corrugated material is universally known as the fin. Similarly, the core dimension is known as the fin height and the material thickness is known as the fin thickness. In the construction of a multi-stage counterflow heat exchanger, the sum dimension of all stacked cores and plates dedicated to a given flow is traditionally known as effective fin height. Thus, effective fin height is the perpendicular length of material extending from the medium or plate used as the ultimate means of conducting heat to the apposing fluid. This effective tall fin could be replaced with a single core of equivalent fin height if available. Heat convected into the tip of the fin is conducted down the length of the fin to the base before conducting across this medium for exposure to the apposing fluid flow. The effect of this process is measured as fin efficiency, and is impeded proportionally with fin height. Since this invention eliminates the perpendicular fin from the conduction plate or medium between hot and cold fluid,

flows, the consideration for fin efficiency is eliminated, or replaced with a factor of one. So in effect the fin efficacy can be considered unity when comparing the effectiveness of this invention to a traditionally constructed heat exchanger. The fact that there is conduction loss thru the thickness of the conduction medium (separator plate) is irrelevant to the effect of eliminating the perpendicular fin. In fact, it is highly unlikely a traditional separator plate would be as thin as the equivalent medium when employing this invention.

Furthermore, in response to the Examiner's statement that the "invention is basically an indirect heat exchanger with separating surfaces, but no fins" Applicant respectfully disagrees.

The present invention does not include separator plates in the sense of typical construction. Separator plates are traditionally installed as a production method of stacking multiple layers of corrugated fin sections. For heat exchangers with one layer or corrugated fin per opposing flow, the separator plate is used to separate the fluid flow and act as a thermal conduction medium between hot and cold flows. For heat exchangers that contain multiple layers of corrugated fin per flow, plates are required between layers to provide mechanical stability to the fin stock during the brazing process, not to separate fluid flow or provide a conduction medium between hot and cold fluids. This invention does not employ separator plates because the corrugated fin itself provides for fluid separation and a conduction medium between hot and cold flows, thereby eliminating that separator plate from the production process. This invention is most effectively utilized when replacing heat exchangers that require a high fin area accomplished through multiple stacks of fin stock with a single fin stack containing a very tall (or high aspect ratio) to duplicate the effective fin area and eliminate the separator plate.

Alternatively, the heat exchanger of the present invention could be considered as containing a multitude of integral separator plates with zero fin height i.e., in the sense of

conduction heat transfer without constructing a multitude of stacked materials to be managed and toleranced in the brazing process.

Moreover, the statement that "the application of the present invention is independent of the convection coefficient and related terms" is intended to suggest that when comparing this application to a traditional multi-stage construction with equivalent fin surface area (overall height width length pitch and material thickness) an equivalent head (system curve) is developed producing identical flow, hence identical convection coefficient. The thermodynamic advantage is that an increased efficiency is realized by eliminating the tall effective fin extending from the conduction medium between the apposing fluid flows. The manufacturing advantage is a simplified and manageable assembly containing fewer parts and reduced tolerance accumulations.

The Examiner has rejected Claims 1-8 and 13-17 as being anticipated by Fischer. Claim 1, as amended, comprises a heat exchanger wherein cold air is released from a plurality of cold air exits and hot air is released from the heat exchanger from a plurality of hot air exits. This is not suggested by Fischer which contemplates a heat exchanger with a single exit for cold air and hot air. The reason for the Fischer arrangement is because, the Fischer patent is specifically designed for high pressure liquid cooling and cannot be employed in the cooling of electronic equipment. The present invention contemplates the cooling of electronic components by air. In Fischer, the liquid enters as one fluid then splits and then recombines to come out as one fluid. In the present invention, there is a plurality of air entrances and a plurality of exits for air to be released. Claims 2-8 and 13-17 are dependant on claim 1 and therefore incorporating the limitation set forth in claim 1. Thus, claims 2-8 and 13-17 are patentable over the prior art.

because the claims incorporate the limitation of a plurality of cold air exits and a plurality of hot air exits.

Claim 9 is rejected as being anticipated by Grill. Claim 9 is a dependant on claim 2 which contemplates cold air released from the heat exchanger from a plurality of cold air exits and hot air is released from the heat exchanger from a plurality of hot air exits. Although Grill may contemplate a manifold split by a divider, Grill does not contemplate the limitation of a release of cold air through a plurality of cold air exits and the release of hot air through a plurality of hot air exits.

Claim 10 has been objected in its dependant form, therefore Claim 10 has been amended to be in independent form. Based on this amendment Claim 11 should be allowable as it is dependant off of claim 10.

CONCLUSION

For the foregoing reasons, applicant's claims are patentable over the cited prior art and the application should be in condition for allowance.

Respectfully submitted,

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